



Building Code Clarification Handout, #2008.002, January 2008; Updated 7-29-09

Energy Efficiency Requirements

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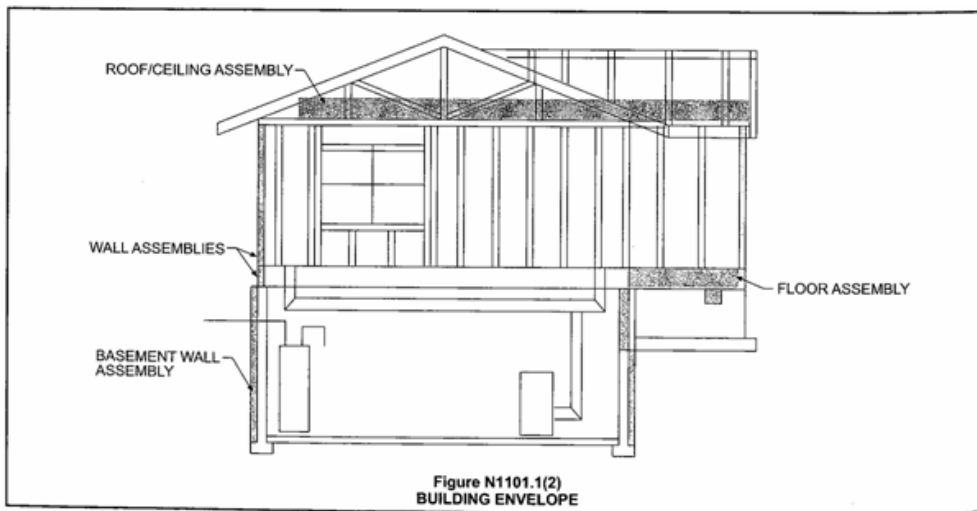
The following building code requirements are the current minimum code standards, as taken from the IRC Code & Commentary 2006, required for One and Two family dwellings, and based on Kentucky Amendments to the 2007 Kentucky Residential Code, Second Edition, May 15, 2007 Chapter 11, Energy Efficiency, and the International Energy Conservation Code. The new 2007 Kentucky Residential Code became mandatory on November 1, 2007; it was actually adopted by the state on May 15, 2007.

Disclaimer: This is not a listing of all code sections involving building or utilities which involve this subject, but only the sections most often questioned. Refer to the 2007 Kentucky Residential Code book for information not listed in this handout and for other requirements of the building code.

Location by Climate Zone: Hardin County per (Table N1101.2), and the entire state of Kentucky, is located in Climate Zone 4, the HDD is 4,000 to 4,999.

Chapter 11, Energy Efficiency. Per (N1101.2.1), The energy efficiency for the design and construction of buildings shall comply by either meeting the requirements of the *International Energy Conservation Code* or meeting the requirements of this chapter.

- 1. Building Thermal Envelope. (Section N1102).** The Building Thermal Envelope is the basement walls, exterior walls, floor, roof and any other building element that enclose conditioned spaces. (KRC Definitions, pg. 10)



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2006 INTERNATIONAL RESIDENTIAL CODE® COMMENTARY

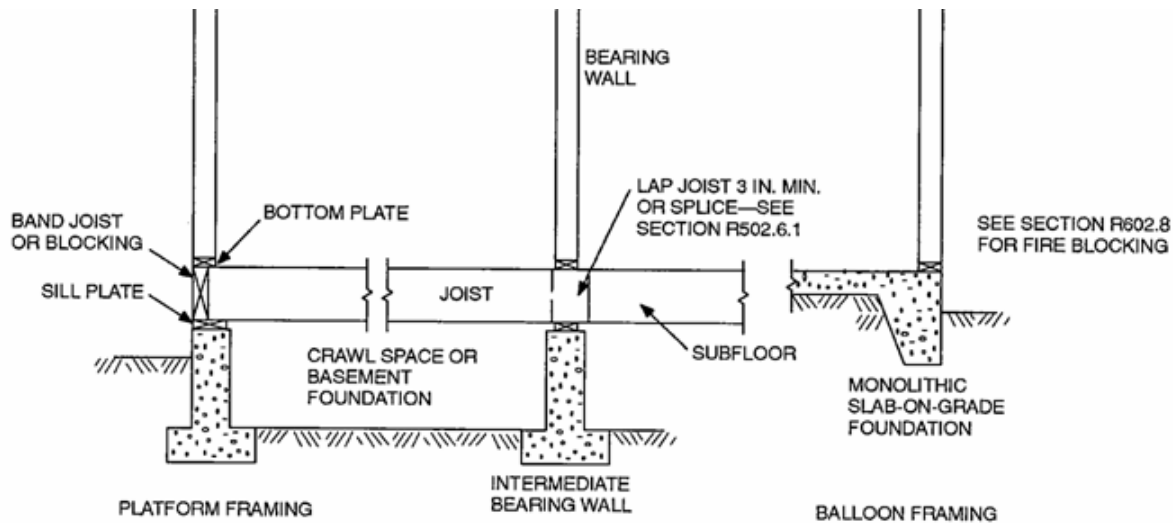
- 2. Insulation and fenestration criteria. (N1102.1)** The building thermal envelope shall meet the requirements of Climate Zone 4 as specified in Table N1101.2. *The term fenestration refers to opaque doors and the light-transmitting areas of a residential building's wall, floor or roof, generally window, skylight, and non-opaque door products.*

- **Fenestration U-Factor. (Table N1102.1)** Provide Fenestration maximum U-Factor 0.40. (A u-factor number higher than U.40 is not approvable).

	World's Best Window Co. Millennium 2000® Vinyl Clad Wood Frame Double Glazing - Argon Fill - Low E Product Type: Vertical Slider
ENERGY PERFORMANCE RATINGS	
U-Factor (U-Factor)	Solar Heat Gain Coefficient
0.35	0.32
ADDITIONAL PERFORMANCE RATINGS	
Visible Transmittance	Air Leakage (ACH50)
0.51	0.2
Condensation-Resistance	
51	
<small>Manufacturer declares that these data comply with applicable NFRC standards for determining window product performance. NFRC ratings are determined by a third-party performance evaluation and verify product data. Contact manufacturer's website for other product performance information.</small>	
The NFRC label provides a reliable way to determine window energy properties.	

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CRAWLSPACE AREA



3. Floors of a conditioned space over outdoor air or unconditioned areas. (Table N1102.1) Minimum insulation required is Floor R-Value R-19.
4. Crawl space wall. (N1102.2.8). As an alternative to insulating floors over crawlspaces, insulation of crawl space walls when the crawl space is not vented to the outside is permitted. Insulation shall be permanently fastened to the wall & extend downward from the floor to the finished grade level and then vertically and/or horizontally for at least an additional 24 inches. Minimum insulation required is **R-10 for continuous insulation or R-13 for cavity wall insulation.** Exposed earth in unvented crawl space foundations shall be covered with a 6-mil continuous vapor retarder with all joints overlapped by 6 inches and be sealed or taped. The edges of the vapor retarder shall extend at least 6 inches up the stem wall and shall be attached to the stem wall. **To comply with this provision, the crawlspace must be mechanically vented or supplied with conditioned air from the living space. (R408.3).**

Under-Floor Space.

5. Ventilation. (R408.1) The under-floor space between the bottom of the floor joists and the earth under any building (except space occupied by a basement or cellar) shall be provided with ventilation openings through foundation walls or exterior walls. **The minimum net area of ventilation openings shall not be less than 1 square foot for each 150 square feet of under floor space area. One such ventilating opening shall be within 3 feet of each corner of said building.**
 - Ventilation openings shall be covered for their height and width with any of the following materials provided that the least dimension of the covering shall not exceed 1/4": Refer to Section R408.2, items 1 through 6.



Exception.

- a. The total area of ventilation openings may be reduced to 1/1,500 of the under-floor area where the ground surface is treated with an approved vapor retarder material (e.g. 6 mil poly) and the required openings are placed so as to provide cross ventilation of the space. The installation of operable louvers shall not be prohibited. (R408.2)
- b. Ventilation openings are not required where continuously operated mechanical ventilation is provided at a rate of 1.0 cfm for each 50 square feet of under floor space floor area and ground is covered with an

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- approved vapor retarder material. (R408.2). Note: Return air (M1602.1). Return air shall be taken from inside the dwelling. Dilution of return air with outdoor air shall not be prohibited.
- c. **Ventilation openings are not required when the ground surface is covered with an approved vapor retarder material, the space is supplied with conditioned air and the perimeter walls are insulated in accordance with Chapter 11. (R408.2)**
 6. **Access Opening. (R408.3) An access opening 18 inches by 24 inches shall be provided to the under-floor space.** See Section M1305.1.4 for access requirements where mechanical equipment is located under floors, the opening will be large enough to remove the equipment through the opening.
 7. **Removal of debris. (R408.4) The under floor grade shall be cleaned of all vegetation and organic material.** All wood forms used for placing concrete shall be removed before a building is occupied for any purpose. All construction materials shall be removed before a building is occupied or used for any purpose.
 8. **Finished grade. (R408.5) The finished grade of under floor surface may be located at the bottom of the footings;** however, where there is evidence that the groundwater table can rise to within 6 inches of the finished floor at the building perimeter or where there is evidence that the surface water does not readily drain from the building site, the grade in the under floor space shall be as high as the outside finished grade, unless an approved drainage system is provided.
 9. **Required Ground Clearance. (R323.1) Maintain required ground clearance of 12" minimum below beams and girders and 18" minimum below floor joists and the wood structural floor.**

BASEMENT AREAS

10. **Basement Walls. (N1102.2.6) Minimum insulation required is R-4 for continuous insulation or R-13 for cavity wall insulation.** Because the rim joist between floors is a part of the building envelope, this must be insulated also if the basement is conditioned, or when the floor is not insulated. **Exterior walls associated with conditioned basements shall be insulated from the inside or outside of the basement wall from the top of the basement wall down to the design frost depth in accordance with Section R403.1.4.**
11. **Walls associated with unconditioned basements shall meet this requirement unless the floor overhead is insulated in accordance with Sections N1102.1 and N1102.2.5. (change effective 7/29/09)** *The last part of this section allows insulating unconditioned basement walls as an alternative to insulating the floors above the unconditioned basement. Although not required, insulating the unconditioned basement walls makes a good deal of sense if a basement is likely to be conditioned at some time after construction. The code does not specify whether the insulation is to be placed on the inside or outside of a basement wall.*
12. **Slab edge width/depth. (Table N1102.1).** Minimum insulation required is **R-4, for a depth of 2 ft.** (Note in Zone 4, for slabs that incorporate heating duct or a pipe, or a heated slab, the minimum insulation required is **R-5 for a depth of 2 ft.** The required R-value shall extend down to the frost line (24").
13. **Moisture Control. (N1102.5).** The building design shall not create conditions of accelerated deterioration from moisture condensation. Above-grade frame walls, floors and ceilings not ventilated to allow moisture to escape shall be provided with an approved vapor retarder. The vapor retarder shall be installed on the warm-in-winter side of the thermal insulation.
Exceptions:
 1. In construction where moisture or its freezing will not damage the materials.
 2. Frame walls, floors and ceilings in jurisdictions in Zones 1, 2, 3, 4A and 4B. (Crawl space floor vapor retarders are not exempted.
 3. Where other approved means to avoid condensation are provided.
14. **Masonry Veneer. (N1102.2.9). Insulation shall not be required on the horizontal (flat) portion of the foundation that supports a masonry veneer.** For slab edge insulation installed on the exterior of the slab, the code allows the insulation to start at the bottom of the masonry veneer and extend downward. *[This is essentially a matter of practicality and accommodates the construction of a "brick ledge" without the need for insulating the foundation at the point where the masonry would bear on it.]*
14. **Protection of foundation insulation. (N1101.6.1).** Insulation applied to the exterior of basement walls, crawlspace walls, and the perimeter of slab-on-grade floors shall have a rigid, opaque and weather resistant protective covering to prevent the degradation of the insulation's thermal performance. The protection shall cover the exposed exterior insulation and shall extend at least 6 inches below finished grade. Plastic foam insulation used below grade shall comply with ASTM C 578.
15. **Mass Wall. (Table N1102.1). Minimum insulation required is R-5.** Mass walls are walls of concrete block, concrete, insulated concrete form (ICF), masonry cavity, brick (other than brick veneer), earth (adobe, compressed earth block, rammed earth) and solid timber/logs. The provisions of Section 1102.1 shall be applicable when at least 50 percent of the required insulation R-value is on the exterior of, or integral to, the wall.
16. **Wood Frame Walls. R-13 insulation is required. (Table N1102.1).**
17. **Ceilings. R-38 insulation is required. (Table N1102.1).** Ceilings with attic spaces. When Section N1102.1 would require R-38 in the ceiling, R-26 shall be deemed to satisfy the requirements for R-38 whenever the full height of uncompressed R-26 insulation extends over the exterior wall top plate at the eaves. (N1102.2.2.1) **Attic insulation markers are required for blown-in insulation to ensure the correct insulation R-values have been installed in the building, in addition to**

Energy Efficiency Requirements

insulation certificates. (IECC 102.1). *Materials, equipment and systems shall be identified in a manner that will allow a determination of their compliance with the applicable provisions of the code.*

- 18. **Fenestration (exterior windows and doors with glass panes) U-Factor 0.40.** The fenestration U-factor excludes skylights. The solar heat gain coefficient (SHGC) applies to all glazed fenestration. There are no SHGC requirements in the marine zone. (Kentucky is in the marine zone.) (Table N1102.1).
- 19. **Skylight U-Factor 0.60.** (Table N1102.1).
- 20. **HVAC Supply & Return Ducts shall be insulated to a minimum of R-4.** Exception: Ducts or portions thereof located completely inside the building thermal envelope. (N1103.2.1) Insulation.

21. **Certificate Required. (N1101.8)**

A permanent certificate (sticker) shall be posted on or in the electrical distribution panel. It shall be placed inside the panel at the time of the Framing Inspection by the building inspector. It shall be completed by the builder or registered design professional, prior to requesting the Final Inspection. The certificate shall list the predominant R-values of insulation installed in or on:

- o ceilings/roof, walls,
- o foundation (slab, basement wall, crawlspace wall and/or floor) and
- o ducts outside conditioned spaces;
- o and U-factors for fenestration (windows & doors). Where there is more than one value for each component, list the value covering the largest area.
- o The certificate shall list the type and efficiency of heating, cooling, and service water heating equipment.

- *The certificate is meant to provide the housing owner, occupant, or buyer with a simple-to-understand overview of the home's energy efficiency. When calculating the energy efficiency obtain the equivalent U-factors in Table N1102.1.2.*

Hardin County, KY	
Insulation Values in Home	
Climate Zone 4	
Date:	
LOCATION	INSTALLED VALUE
FENESTRATION U-FACTOR	
SKYLIGHT U-FACTOR	
GLAZED FENESTRATION SHGC	
CEILING R-FACTOR	
WOOD FRAME R-FACTOR	
MASS WALL R-VALUE	
FLOOR R-VALUE	
BASEMENT WALL R-VALUE	
SLAB R-VALUE	
SLAB DEPTH IN FEET	
CRAWL SPACE R-VALUE	
TYPE & EFFICIENCY OF HEATING SYSTEM	
TYPE & EFFICIENCY OF HOT WATER HEATER	
GENERAL CONTRACTOR	
INSULATION CONTRACTOR	
FORM COMPLETED BY	

<u>QUICK SUMMARY LISTING</u>	<u>Climate Zone 4, Kentucky</u>
Fenestration U-Factor: 0.40	
Skylight U-Factor: 0.60	
Ceiling R-Factor: R-38	
Wood Frame Wall R-Value: R-13	
Mass Wall R-Value: R-5	
Floor R-Value: R-19	
Basement Wall R-Value: R-4 (Continuous Insulation) / R-13 (Framing cavity insulation).	
Slab R-Value: R-4; Depth of 2 feet Note: Heated slabs: R-5	
Crawlspace Wall R-Value: R-10 (Continuous Insulation) / R-13 (Framing cavity insulation).	

Building Code Clarification Handouts Available Listing, 03-25-08

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|---|---|
| 2008.001, Crawlspace & Basement Requirements | 2008.008, Egress Windows and Window Wells |
| 2008.002, Energy Efficiency Requirements | 2008.009, 2007 Top Residential Code Requirements (Booklet) |
| 2008.003, Accessory Structure on Residential Lots | 2008.010, Inspection Checklist |
| 2008.004, Dryer Vent Requirements | 2008.011, Ramps, Landings, etc. for the Physically Challenged |
| 2008.005, Footing Inspection Checklist | 2008.012, Swimming Pools |
| 2008.006, Deck and Stair Guide | 2008.013, Floodplain Requirements |
| 2008.007, Windows & Doors- Safety Glazing | |

[Energy Efficiency Requirements](#)